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ABSTRACT

This study explored developmental patterns in the acquisition of the gross motor skill of throwing among 110 educable, mentally retarded 7- to 12-year-olds. Each child was examined through cinematographic procedures to discover: a) variance in throwing patterns, b) elements composing throwing skills, and c) sequential integration of the elements for the development of efficient throwing patterns at different levels of development. The criteria used to determine the maturity of the throwing pattern were: a) the number of contributing body parts involved in the throw, and b) the integration of the number of elements of the throw that mediated progressively more efficient throwing patterns. From the above criteria, all subjects were grouped into 15 categories of throwing patterns. Results are discussed; seven references are included. (BRB)

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Throwing Patterns of the Mentally Retarded

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Motor development of educable mentally retarded and normals indicates that mentally retarded children lag behind normal children of the same chronological age on gross motor skills. (Francis and Rarick, 1960; Howe, 1959; Byrd, 1969)

In a comprehensive study of the motor characteristics of the mentally retarded, Francis and Rarick indicate that educable mentally retarded children of school age lag between two and four years behind normals of the same chronological age and this performance discrepancy increases with age.

Considerable research has been conducted on measured performance of gross motor tasks of the mentally retarded and on developmental patterns of gross motor tasks among normal populations. (Bayley, 1935; Gutteridge, 1939; Shirley, 1931) However, there is a paucity of information regarding the development of efficient gross motor patterns involving basic motor skills by the mentally retarded.

If the educable mentally retarded have greater difficulty in the acquisition of gross motor tasks, through intensive study, it may be possible to discover more discreet steps in the developmental process in gross motor development.

An exploration of the synthesis in the development of a gross motor skill may assist refinement in the systemization of sequences while obtaining the acquisition of a basic gross motor skill. The unveiling of developmental hierarchical progression may provide additional and more discreet guidelines for implementing diagnostic remedial approaches in motor development programs for children who lag in the development.

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Therefore, the purpose of this study was to explore developmental patterns in the acquisition of the gross motor skill of throwing among educable mentally retarded children.

PROCEDURES

The subjects in the study consisted of 72 educable mentally retarded boys and 38 educable mentally retarded girls from the Mansfield Training School, Connecticut; Southbury State Training School, Connecticut; State Colony at New Lisbon, New Jersey; The Joseph Ladd School, Rhode Island; Walter E. Fernald School, Massachusetts; and the Wassaic State Training School, New York. These boys and girls were between the ages of 7 and 12 years when initial data was collected. The IQ range was from 50 to 75. All subjects were free from physical handicaps.

A spring operated, 16 mm camera set at 64 frames per second was used to take films for the purpose of cinematographical analysis of the throwing skill. Methods used similar to Singer in both filming and analysis of data were used in the study.

Each of 110 throwers were examined through cinematographical procedures and compared to discover (1) variance in throwing patterns among the mentally retarded (2) elements that compose throwing skill and (3) sequential integration of the elements for the development of efficient throwing patterns at different levels of development.

The specific frames which were studied to reveal this information are as follows:

1. the frame at which the greatest backswing of the arm occurred
2. the frame in which greatest flexion of the elbow occurred
3. the frame in which the ball was released
4. five frames after the release of the ball to determine the distance

the ball traveled over time and

5. the follow through frame.

The criterion used to determine the maturity of the throwing pattern were as follows: (1) Number of contributing body parts involved in the throw. (2) The integration of the number elements of the throw which indicated progressively more efficient throwing patterns.

Each of the 110 subjects were examined according to the previously stated criterion and roughly placed on a scale from lesser to greater efficiency in the throwing patterns. From this ordering of subjects, 15 groups of performers possessing similar throwing patterns were categorized which indicated increasing developmental levels of efficient throwing patterns. A performer was then intuitively selected from each group which best represented the throwing pattern of that group. The elements of the throwing patterns and the sequential fusion of the elements of the pattern which demonstrated increased efficiency in throwing were studied for comparison.

DISCUSSION

In the process of motor development, partial patterns arise within total patterns of gross motor skills. This leads to the integration of behavior to increasing complexity which gradually moves the organism to higher levels of effectiveness. These developmental principles were observed in the study of the involving throwing patterns where the objective of a specific performer was to propel an object maximal distance.

In the development of motor patterns involving the throw as studied by a cross section of the population, the mentally retarded, progressed to greater neuromuscular exactness in which there was integration of partial patterns to form more refined and efficient throwing patterns.

The cross sectional developmental study of throwing patterns of the 110 educable mentally retarded children clearly indicates that:

1. Patterns of performance increase in complexity with elements of the throwing pattern precise enough to be clearly defined.
2. There is a gradual fusion of new elements with those of old established patterns that increase ability to perform according to accepted conceptualized performance model which is derived from the application of sound mechanical principles. (Broer, 1966)

The elements of the throw involving educable mentally retarded children which integrate into patterns to form more efficient patterns have been classified by this author as follows:

1. Temporal-spatial relationships of integrated movements relevant to providing greater force to propel the projectile.
2. Spatial-temporal relationships relevant to optimal time for releasing the projectile for increased performance efficiency. The closer the release is to the center of the throwing are the more efficient the throwing pattern.
3. Effective utilization of the principle of leverage and force in the throwing patterns. This refers primarily to elbow and arm, knees ankles, and hips for positioning for greater leverage and force.
4. The rotation of the body
5. The efficient utilization of the arms in the throw
6. The efficient utilization of the legs in the throw
7. The follow through

The progressive fusion of elements with those of old established patterns are manifested in the following behavior:

1. The number of integrated joint actions involved in the throwing pattern

2. The length of the stride and efficient transfer of weight
3. The length of the throwing arc--the longer the arc, the greater the possibility of force application
4. The nature of the weight transfer--does it contribute to the throw

Each of the above mentioned elements appeared to develop independently of one another. When children were compared, it could be seen that some were further advanced in a specific element but lagged behind the compared child in other skill elements.

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